would produce a nib which would provide acceptable fluid transfer properties when used to write on extremely soft substrates. A large number of materials were tested for this application. Materials tested include open cell polymer foams, sintered porous polymers, felted natural and synthetic fibers and loosely bundled natural and synthetic fibers (like brushes). While some of the materials tested possessed the desired degree of flexibility and other materials tested provided effective fluid absorption and transfer to substrates, only one of the materials tested possessed both properties and functioned well in the intended application. Open cell foam comprised of acetalized polyvinyl alcohol (PVOH, or sometimes referred to as PVA) was not only highly flexible but was also capable of being prepared in a manner in which the foam is extremely hydrophilic. The ability of the foam to readily absorb and transfer aqueous fluids as well as the foam's high degree of flexibility makes it well suited for use as a nib material in the instant invention. PVOH nibs produced were examined under a microscope and compared to the more conventional felt-tipped pen nibs previously tested above. It became apparent that an additional factor was functioning in the PVOH nibs which permitted them to function well for the intended application. The PVOH nibs we prepared are capable of absorbing and holding approximately 10 times their weight in aqueous fluid. Significantly, this fluid is not only present in the interstitial cells within the body of the PVOH structure but the fluid is also highly present at the outer surface of the PVOH structure. This means that whenever the PVOH nib is brought into contact with the surface of another object that the fluid contained on the surface of the nib is

instantly available to be transferred to the surface of that object. Additionally, because the cell structure of the PVOH nib is very open, capillary action can readily carry fluid from the interior of the nib to the surface of the nib to replace that fluid transferred to the object being written on. The combination of high flexibility, high hydrophilicity and high levels of fluid at the surface of these nibs make them excellent candidates for writing on extremely soft materials.

A number of nibs were fabricated from PVOH for testing and evaluation. These nibs were fixtured in specially prepared pen barrels and a filled fluid reservoir was coupled to the nib. In all cases the nibs provided excellent fluid transfer to the soft frosting substrates on which they were tested. The nibs were tested on a variety of ready to spread frostings as well as home-made frostings, soft breads, flavored gelatins, apples, crackers and other food items. The pens which employed the PVOH nibs performed surprisingly well on all surfaces and permitted the user to easily draw detailed graphics even on freshly spread frosting. In an effort to quantify the difference between the nibs we produced and those others tested we devised a series of tests.

While it was not initially apparent, we later determined that the special shape of our nibs contributed to their ease of use when writing on extremely soft substrates. We experimented with a variety of shaped nibs including straight round shaft, tapered round shaft, rectangular shafts and chisel shaped tips. After testing our nibs to determine the force exerted by the nib verses pen displacement

towards the substrate it became evident that superior performance could be obtained from a nib which was tapered in a concave fashion towards the tip. While conventional felt-tipped pen nibs typically employ a straight conic taper or a bullet shaped convex taper, it was found that the concave taper of the instant invention provided an additional level of control. This additional control is achieved because the concave taper provides for a nib shaft which is not substantially larger than the nib tip which it supports and which shape yields a very gradually increasing force to the substrate with respect to pen displacement towards the substrate. In a conventional pen nib it is desirable to provide as rigid a support as possible for the nib tip so that the user always knows where the nib tip is with respect to the pen barrel. However, when writing on extremely soft substrates, it is far better to let the nib shaft flex so that the nib tip is free to be laterally deflected by the reactive force of the substrate. This concave tapered nib design was scalable, that is, the actual size of the nib did not appear to diminish this added control gained by the special shape of the nib. Additionally, this high degree of nib shaft flexure permits the drawing direction of the pen to be changed without causing significant damage to the soft substrate even though the pen may have not been lifted from the substrate prior to the change in the drawing direction. This is because the highly flexible nib shaft "weather vanes" as the relative direction of the nib to substrate motion is changed. This weather vaning action helps to prevent gouging of the substrate as well since the nib to substrate action is maintained in the dragging mode as opposed to a pushing mode.